THE
VETERINARY JOURNAL

OCTOBER, 1927.

Editorials

THE ROYAL VETERINARY COLLEGE CHAMPIONSHIP DOG SHOW.

It has been a gracious act on the part of Her Royal Highness Princess Mary, Viscountess Lascelles, to consent to personally attend and present the prizes, receive purses and personal donations at the Royal Veterinary College Championship Kennel Club Show which is to be held at the Crystal Palace on the 27th and 28th of this month on behalf of the Rebuilding Fund. Not only is it a token of the interest which Her Royal Highness takes in the veterinary profession as symbolic of healing, in so far as it concerns the dumb creatures who are unable in that respect to help themselves, but it is expressive of one of those kindly acts for which the members of our Royal Family are so justly celebrated, and which tend so much to cement the loyalty which exists in Great Britain between the Throne and the people.

With such a lead it only remains for the members of the profession to act up to the motto of *Vis Unita Fortior* in order to make the Show a huge success by which a substantial sum will be added towards the £250,000 which is necessary for the buildings and endowment of the chairs.

All the money which is obtained, after certain unavoidable expenses are settled, will be handed over to the Earl of Northbrook, the Treasurer of the Fund, as the Officials, including that clever and experienced organiser of kennel club shows, the indefatigable Secretary, Mr. E. T. Cox, have given their services without fee or reward; and the Profession can help by persuading clients to enter their dogs, or, if they have no dogs, to attend the Show with their friends.

The actual inception of the idea of holding the Show originated from a well-known member of our profession, Mr. Cornish-Bowden, M.R.C.V.S., who has also the honour of being a member of the Committee of the Kennel Club. Mr. Cornish-Bowden mentioned it to his fellow-committeemen, who took up the idea with enthusiasm, and proposed that the concessions which the introduction of an extra championship show involved should be stated to be given " as a recipro-

cation of the generous help which the veterinary profession had given gratuitously on so many occasions towards furthering the interest of dog shows," a courteous thought which will be appreciated by every veterinary surgeon who has an interest in canine matters.

That the forthcoming Crystal Palace Show will add money for the work of the profession is a foregone conclusion, but this is not the only, nor is it the most important thing which will result, for it will still further (if possible) cement the good fellowship which exists between the Veterinary Profession and the Kennel Club.

THE PROFESSIONAL ASPECT OF TENDERING FOR CONTRACTS, &c.

THE members of our profession in and around Twickenham, Surrey, have set a worthy example of professional etiquette which it is hoped will be followed on every possible occasion, when that occasion arises.

The circumstances were that the appointment of Veterinary Surgeon to the Twickenham Town Council had fallen vacant and the Town Clerk had issued an advertisement asking for tenders to professionally attend the horses, when ill, by contract.

A letter was submitted to the Council from the Secretary (Mr. Bullock, LL.D.), of the Royal College of Veterinary Surgeons, drawing attention to the Corporation's advertisement, wherein no salary was mentioned, but applicants for the position were required to quote a fee per horse per annum at which they would be prepared to carry out the duties of the office. The Council of that College had passed a resolution some years ago to the effect that the practice of certain public bodies in advertising veterinary appointments as open to tender was opposed to public interests and to the dignity of the profession and ought to be abandoned. It was also considered to be contrary to professional etiquette for members to tender for such appointments, and the secretary had therefore written to all members practising in the Twickenham area to remind them of that decision. The Town Clerk further reported that various applications had been received for the appointment, but that no fees had been quoted or, where quoted, had subsequently been withdrawn. The Town Clerk was instructed to communicate with three local veterinary surgeons inquiring whether they were prepared to carry out the work at a fee of £2 2s. per horse per annum, with additional fees in respect of the inspection of other horses purchased by the Corporation, and in that case to give full particulars of their experience and qualifications.

This is as these matters should be arranged, for it is undoubtedly lowering to the dignity of the profession to be asked to tender in competition with one another, for positions under Public Authorities.

General Articles

THE ROYAL COMMISSION ON AGRICULTURE IN INDIA AND THE INDIAN VETERINARY SERVICE.

By ANGLO-INDIAN.

II.—Animal Husbandry in India.

The problem of the promotion of effective measures for the improvement of stock in India is full of interest to the rural economist. It is complicated by religious sentiment and ignorant practices to a degree which can only be appreciated by those who have a long and intimate acquaintance with the local conditions. Much ink has been spilt and continues to be spilt in explaining the existing position, and in proposing solutions, but a comprehensive scheme of improvement has yet to be formulated. A fixed policy and a large financial outlay are required to bring it about.

As a result of the labours of the Royal Commission on Agriculture, it may be anticipated that certain concrete proposals and recommendations will be made. Evidence of considerable value has been recorded from which it is clear that the question is of paramount importance, though it does not appear that any witness has stated anything that has not already been said and written repeatedly for many years. A few witnesses seem to have been hazy in their facts from lack of local knowledge.

Shortly, the position is that during the last quarter of a century or more, agricultural conditions in India have greatly altered and large tracts of land, which were practically wastes, have been brought under cultivation. It is true that these wastes provided indifferent grazing at certain seasons of the year, but they could scarcely be regarded as permanent pastures. The cultivation, or rather the maintenance of pastures is practically unknown in India.

In consequence of the gradual restriction of grazing areas the pastoral and nomadic population interested in stock raising as a means of livelihood is changing its occupation. The castes employed in the industry were largely parasitical in their habits and ideas and no capital expenditure entered into their calculations. Their herds were subject to famine and disease, but these were fatalistically regarded and on the whole the laws governing the survival of the fittest worked remarkably well. The milk of the cows was not a marketable commodity and the wants of the herdsmen were not great. Consequently, the young stock was not unduly stinted in this respect.

The contraction of free grazing has limited the activities of the professional breeders in most parts of the country, and also the

rather limited efforts of those peasants who endeavoured to supply their own needs. The result has been an increase in the number of professional cattle dealers, who travel over large areas, and exploit the ordinary agriculturist, who depends on purchasing stock (more particularly plough oxen), with usorious ferocity. Under the changing conditions, the purchase cost of cattle has greatly increased and is still increasing. Most of the profit goes to the middleman.

Plough oxen are essential to the Indian agriculturist who, generally speaking, has not yet learnt to supply his own needs in this respect. He may keep a few cows, but for his milk and *ghi* (butter) he relies mainly on buffaloes. Where cows are kept the calves are, as a rule, grossly neglected and are not profitable. Scrub stock of no economic value is to be found in almost every village in consequence. In the urban areas the professional milk vendors and private persons who keep cows, habitually starve the calves and young stock and no continuity of supply is normally expected from this source. There are many other economic difficulties, but the outstanding feature is that the professional stock breeder of the last and previous generation is rapidly passing and has not been replaced by private endeavour.

The process of natural selection referred to above produced some excellent and distinctive breeds of cattle, both for draught and milch purposes. These remained fairly true to type and were suitable to the needs of the areas they supplied. The changing conditions have created a greater demand for and a smaller supply of good animals. Many breed types are losing their characteristics. There is an excess of uneconomic mongrel and scrub cattle. A smaller number of unproductive and a larger number of productive animals is an obvious need but difficult to bring about. Census returns show fluctuations in the cattle population, but the number of head does not represent the true monetary value. Deterioration in quality and quantity, if any, is not due entirely to the contraction of grazing grounds. The lack of any adequate system for the conservation of fodder is undoubtedly a serious factor and requires attention urgently. It is necessary to foster private enterprise leading to another form of professional endeavour and herein the importance of the fodder problem is outstanding.

In some parts of India, and more particularly in the Punjab, something has been done to interest the agriculturist in cattle breeding. More progress would doubtless have been made if the requisite financial support had been forthcoming, but, nevertheless, during the past twenty-five years thousands of stud bulls have been distributed in this part of India with excellent results. One of the most advanced agriculturists in the Province recently informed the writer that in his

opinion the Civil Veterinary Department had saved the situation in the Canal Colonies. It must be remembered that the agriculturists in the Punjab Colonies are generally more enlightened than in other districts and more likely to take advantage of progressive ideas. Native estates have been slow to take up the question, although in many of them excellent types of cattle are to be found.

It is urgently necessary to interest land holders and others in cattle breeding on sound lines and to supply them with the nucleus for the purpose. More farms for the production of suitable type animals should be established. Many of the indigenous types are remarkably good, but require to have their useful characteristics developed.

In the case of types used for draught, for which there is a great demand, milking qualities have been neglected by the professional breeder who is ignorant of their importance. The expense involved in milk recording has prevented many Government institutions from employing the necessary staff, but conformation both for draught and milch purposes has been attentively regarded. It is impossible at present to hope for accurate milk recording on the part of private persons, and the expense of supervision would be prohibitive.

In many quarters a dual purpose animal has been suggested as suitable for India, but it must be remembered that in that country a dual purpose animal must possess draught and milch and not meat and milch qualities. It is doubtful if the former qualities can be produced in one type to advantage. Even in England, where the Shorthorn is regarded as a typical dual purpose animal, it has been found necessary to divide the breed into two classes, one for meat and one for milch qualities. Every endeavour should be made to increase within reason the milking qualities of the breeds of draught cattle in India for the sake of the young stock, but it should be realised that over-development of milking qualities would certainly result in deterioration of draught qualities. The indigenous milch breeds are unsuitable for draught purposes, but they should be fostered and improved for their milch qualities. Cross breeding is not likely to be successful in India and has many grave disadvantages. The wisest policy is to concentrate on the existing types which are suitable to their environment and the needs of the inhabitants.

The above remarks apply to some extent to sheep and goat breeding.

The development of these industries in India on sound lines is strongly indicated. Horse, mule and donkey breeding is a separate problem which does not affect the agriculturist so closely, though the industry is important in some parts of the country.

Camel breeding is confined to certain areas, but deserves attention.

In order to effect improvements in animal husbandry in India, and to deal with a situation which bristles with peculiar and amazing difficulties, it is apparent that the various administrations in India must make up their minds to face large initial expenditure and entertain a personnel of considerable strength capable of specialising in the subject.

Hitherto, members of the Veterinary and Agricultural Departments have endeavoured to deal with the problem in addition to performing their own duties and the subject has received considerable attention at meetings of the Board of Agriculture and subsidiary conferences. Before the constitution of the Agricultural Department, cattle-breeding operations were left entirely in the hands of the Veterinary Department, but, with the exception of the Punjab, where the Department has always been stronger than in other Provinces, little could be done owing to lack of officers and financial support. The apathy of some of the local administrations in this connection has been lamentable. The tendency of local governments has been to refuse any expansion of the superior staff of the veterinary services for cattle breeding work and to seek for a less expensive agency. Latterly some administrations have appointed cattle-breeding experts possessing various or no particular qualifications, and have shown an inclination to provide funds in more generous spirit. This is not infrequent when a strange appointment is made.

It is a mistake, however, to imagine that even a highly qualified expert in stock-breeding from abroad is capable of dealing with the problems before him in India until he has obtained some years' experience of the peculiar conditions existing in that country, and money may easily be spent unwisely. It takes time and experience to appreciate the genuine and imaginary difficulties of the Indian peasant and innovations should be introduced with great circumspection based on accurate knowledge of the situation. Measures for improvement that have proved successful in other countries do not necessarily suit India. The point of view of an Indian peasant, who possesses a valuable cow, in regard to the advisability of showing it may be instanced.

In the first place he is not keen on advertising the fact that he owns a good cow for fear she might be stolen. He may be compelled however, to show her by an over zealous petty official who is desirous of earning favour for helping to obtain entries. It may be necessary to take the animal fifty miles by road, involving many risks and inconveniences. If a prize is gained it is unlikely to be of sufficient value to pay expenses and finally an influential official may wish to

purchase the animal The latter is doubtless well intentioned, but the purchase is probably effected through the agency of a petty official, who leaves the owner no option and small profit.

There has been considerable discussion in India as to whether the development of animal husbandry should be in the hands of the local Agricultural or the Veterinary Department, and fruitless arguments regarding the qualifications of the respective personnel have taken place. In point of fact, there is plenty of scope for the activities of both departments working in co-operation. The Agricultural Departments should deal with the fodder problem more particularly. It has hardly been touched at present, and little or nothing has been done to establish fodder reserves, official or private. The Veterinary Departments should deal primarily with epizootic disease, which is more than sufficient work for the existing personnel.

Separate departments of Animal Husbandry should be created as branches of the Bureaux of Agriculture proposed in a previous article. They should be staffed by veterinary officers, agricultural officers, physiological chemists, experts in genetics and dairy experts who are desirous of devoting their whole time to the work and whose tastes lie in that direction. All possess certain basic knowledge qualifying them for the work, though by nature of his training the veterinary surgeon is probably as well or better equipped than any. All would find it necessary to acquire special knowledge to deal with the peculiar conditions and they should resolve to make the animal husbandry branch their future career.

The Government of India and the local administrations should make the department attractive to officers selected for the work by providing for adequate promotion on parallel lines with other departments.

NOTES ON CATTLE IN HARIANA.*

By R. BRANFORD, M.R.C.V.S.,
Live Stock Expert, Punjab.

A GREAT deal has been written recently on the subject of the decline in the quality of Indian cattle. As regards the cattle of India generally, most authorities agree that rapid deterioration is taking place. Conditions in India are usually such that deterioration appears to be inevitable. However, so far as the Hariana tract is concerned, my personal opinion is that deterioration is not taking place. Many of the best authorities I think agree with this view, but it is difficult

* *Journal of the Central Bureau of Animal Husbandry and Dairying in India*, July, 1927.

to get evidence on such a point, other than opinions based on the memories of officers and others connected with the cattle industry.

Recently, when reading the report of the Hissar Cattle Farm Committee of 1898, I did notice one or two items with a definite bearing on this point. In his evidence before the Committee, Lieut. Hilliard stated that he attended the Jahajgarh Autumn Cattle Fair of 1895, and was informed by the Tahsildar that probably not more than 100 bullocks up to the Army Transport and a similar number up to the Siege Train standard could be collected. The officer further stated that he eventually selected 60 bullocks up to the Siege Train standard, but was unable to purchase; the average price demanded being Rs. 100, whereas he was allowed Rs. 60. If we are to believe the Tahsildar, there is no need to go further for proof that the Hariana cattle have improved, as it is always easy to collect many thousands of bullocks up to the Army Transport standard now anywhere in the Hariana tract. Personally, I cannot believe such a statement; the man either knew nothing of bullocks, or else did not want the trouble of collecting them. I think we may infer, as Lieut. Hilliard was on the spot and apparently did believe him, that the standard of that fair was not very good.

Capt. Lloyd stated that he attended the Jahajgarh Autumn Cattle Fair of 1897. His evidence rather contradicts Lieut. Hilliard. It was reported to him that 4,000 bullocks mostly up to Army requirements (presumably transport) had been sold in the fair prior to his arrival. He said the bullocks he saw in the fair were of a good stamp. Capt. Lloyd was also hampered by prices being too high to suit his sanctioned average, but he purchased 19 bullocks:—Average age, 4 years 8 months; average height 53 inches behind the hump.

A comparison of the above experiences 30 years ago with to-day, does not reveal any evidence of deterioration. For example, I visited the Jahajgarh Spring Fair in March, 1927; in five days 13,000 bullocks were sold, which number was below the average of recent years. I saw no bullock not up to the Army Transport standard. A large percentage were up to the Siege Train standard. I also visited the Hissar Spring Cattle Fair. I could have easily bought many hundreds of bullocks up to the Siege Train standard. I actually did purchase 21. Their average age was 4 years 7 months, and the average height 56 inches behind the hump. Like Capt. Lloyd I was hampered in my purchases by high prices.

We know from census reports that the total number of cattle in the Hariana tract is about the same now as it was 30 years ago. The actual approximate figures for bullocks and male buffaloes are—

1897, 4,300,000; 1923, 5,000,000. So far as the plough bullock is concerned, the position does not seem unsatisfactory; we have more than we had 30 years ago, and of quite as good quality.

Hariana Cattle as Milkers.

Personally, I agree with the author of the 1914 Punjab Cattle Census Report that the chief end of all Punjab cattle breeding is the plough bullock. I also agree with the exponents of the dual-purpose school, that the ideal animal for India is the cow capable of breeding a first-class bullock, and also of producing some milk for her owner over and above the requirements of her calf. In my opinion a large proportion of cows in Hariana approach or reach this ideal.

Buyers certainly complain that good milch cows are harder to get than formerly, and make the deduction that both numbers and quality have decreased. So far as numbers are concerned, I think there is no doubt that the number of cows exported annually from Hariana for milk purposes is much greater than it was 30 years ago. Demand has increased. For every cow available for sale now there are twice as many potential buyers as there were 30 years ago. Consequently cows are more difficult to buy, although in my opinion more cows are available.

As regards quality, I cannot produce much evidence, except my own personal experience, and that as far as purchased cows is concerned is small. For the past two years I have been willing to buy good cows, and a large number have been offered to me; few come up to the high standard I require as regards size and conformation, but as regards milk there is no difficulty in finding animals yielding 12 to 16 lb. This always has been my experience (dating from 1911), and I believe has been the case for 30 years. In support of this I can again quote the report of the Committee on the Hissar Farm in 1898. In his evidence before that Committee, Nanak Chand Zaildar estimated that the milk yield of cows in the district averaged 5 to 6 seers. Lekh Ram Zaildar estimated 7 to 8 seers. Cows giving over 20 lb. are not easy to buy now, but I see no evidence that they are less common than they were 30 years ago.

As regards the farm itself, had we been in the past able to pay as much attention to milk as the subject no doubt deserves, ample evidence would have been available that a large proportion of the farm-bred cows are dual-purpose animals. Daily milk records have only been kept for a little over one year, the necessary staff to record a few cows only having been sanctioned from April 1st, 1926. We already have the following performances on record:—

XUM

Cow's No.	No. of days in milk.	Milk drawn and weighed.	Estimated amount suckled by calf.	Total.	Lactation.
		lb.	lb.	lb.	
458 4/8 ..	412	5,965	1,724	7,689	2nd calf
190 2/0 ..	277	2,472	1,454	3,926	Do.
211 3/2 ..	291	3,804	1,482	5,286	6th calf
347 2/0 ..	290	2,751	1,480	4,231	2nd calf
287 4/1 ..	261	2,534	1,422	3,956	9th calf
53 1/6 ..	299	2,992	1,498	4,490	4th calf
544 4/7 ..	296	3,024	1,492	4,516	2nd calf
274 3/2 ..	291	2,540	1,482	4,022	1st calf
207 2/0 ..	266	2,297	1,432	3,729	2nd calf
205 3/2 ..	302	2,665	1,504	4,169	6th calf
240 4/2 ..	291	2,866	1,482	4,348	Do.
104 2/2 ..	282	1,894	1,464	3,358	1st calf
190 2/2 ..	327	2,387	1,554	3,941	Do.
329 2/2 ..	329	1,852	1,558	3,410	Do.
157 2/2 ..	320	1,826	1,520	3,346	Do.

The above totals are probably underestimated. All the above cows reared their calves in very fat condition, and I think the calves got more than estimated. The estimates are based on my instructions to allow the calves 8 lb. per day for the first three months, 6 lb. and a little corn for the next three months, and as little as possible after till the cow is dried, consonant with keeping the cow in milk. I estimate this amount at 2 lb. per day. Actually the calf always suckles a little before milking and does the stripping after milking. It is difficult also to break our men from giving the calf full two teats for the first six months, even when the cow is giving more than 8 lb. from the other two. The five 1st-calf heifers in the above list were all very wild, and were milked with the greatest difficulty to start with. All five are very promising milkers. No. 207 2/0 is now in milk again. Her calf died 20 days after birth, but she is giving 20 lb. per day. In addition to those in the above list, 12 more cows have given over 3,000 lb. in a lactation.

As regards weaning at birth, the calves are the first consideration on this farm, and I do not intend to attempt weaning for the present on any considerable scale. I rather doubt, however, whether the

common opinion that Hariana cows are specially difficult to wean is correct. Hariana cows certainly sometimes milk well after their calves have died. At present I have two milking very well, one No. 207 2/0 already referred to giving 20 lb. daily, and another, No. 346 4/3, 13 years old, giving 16 lb. daily. The calf of the latter died the day after birth.

ARE HARIANA COWS PROLIFIC ?

I have always held the view that the Hariana cow, given sufficient nourishment, breeds readily. I have recently been somewhat surprised to hear views to the contrary. The following statistics of births on the Government Cattle Farm, Hissar, for the last five years may be of interest. For the five years 1922 to 1927, the herd of breeding cows maintained has been approximately 1,500. The average number of calves born per annum over the whole period is 69 per cent. The best year was 1923-24 with 80 per cent., and the worst year was 1924-25 with 57 per cent. These figures are for the whole herd, the majority of which live by grazing alone, except at times of severe fodder famine. As a rule, these cows, for varying periods every year, have to travel very great distances daily in order to fill themselves. At such times they do not breed readily. Cows in our milk lines, which always get some extra feeding, and are, of course, sufficiently stall-fed in times of fodder famines, show rather higher percentages.

Births from one register of 41 cows, which had given three calves or more, averaged 77 per cent. per annum : one calf every 15½ months.

One cow had 10 calves in 12 years.

,,	10	,,	11	,,	
,,	11	,,	13	,,	
,,	7	,,	7	,,	
,,	8	,,	9	,,	etc.

We have been feeding rather more generously for milk in the last three years, and most of the younger cows appear to be producing a calf every year.

PRICES OF HARIANA CATTLE.

Buyers of both bullocks and cows in Hariana tract now commonly complain of high prices. My view has always been that prices are much too low. How the breeders and rearers are able to get their stock into the magnificent condition they invariably produce them in at fairs, and sell at the low prices they do sell at, has always been a mystery to me. The condition in which the animals are usually brought to fairs cannot be attained without much stall feeding. One can only assume that the return to the breeders in the case of bullocks, by working them young, and the average grazing available while

rearing, is more than one would think possible. Prices no doubt do tend to rise, but I do not think they have risen in proportion to the rise in the prices of grain and fodder. According to the report of the Committee on the Hissar Farm of 1898 already referred to, Lieut. Hilliard in 1895 found that the prices of good bullocks at Jahajgarh was about Rs. 100 each. In 1897 Capt. Lloyd actually bought 19 at an average of Rs. 92, but stated that high prices prevented him from getting the best animals available. From these figures I deduce that in 30 years the price of bullocks has about doubled. As regards the prices of cows, the old rates in the tract are said to have been Rs. 10 per seer, i.e., a cow yielding 10 seers of milk would sell for Rs. 100. If that is correct, the price of cows has not doubled. Certainly not to the breeder, and very rarely to the dealer even, although the more astute dealers are occasionally able to sell for Rs. 200 or even more. I estimate the average price now for cows in milk at about Rs. 15 per seer. The price of grain and probably fodder also has meanwhile more than doubled in the last 20 years or so. According to the " Hissar Gazetteer " the average price of gram for the year 1905 was 33 seers to the rupee and of barley 35 seers to the rupee. The average price in the last three years of both gram and barley has been between 10 and 11 seers. I infer that the price of cattle has not risen in proportion to the prices of feeding stuffs.

RURAL DENMARK AND ITS LESSONS.*

By S. D. JOSHI, B.Sc. Agri. (Lond.), B.Sc., M.S.E.A.C.,
Research Assistant to the Plant Pathologist, United Provinces.

Denmark is the best living example of how a predominantly agricultural country can be highly prosperous, and of how, with combined efforts, a nation can adjust its farming to altered circumstances within a short period. It is this small country which has to-day become the field laboratory of the student of agriculture and rural and social economics from every part of the world.

Denmark has a total area of 16,608 square miles, which is less than one-sixth of the area of the United Provinces. Three-fourths of this is agricultural land. It has been an agricultural country from the earliest times. Until the middle of the 19th century it chiefly produced grain, the surplus of which was exported to Germany and other Continental countries, and was the main source of income for the farmer. Towards the second half of the last century, the Danes found that grain production had become unprofitable and that farming land without sufficient livestock had depleted the soil fertility. They

* *Journal of Central Bureau of Animal Husbandry and Dairying in India*, July, 1927.

quickly realised the direction of change. There was Great Britain, separated only by a narrow stretch of sea, with its large demand for butter, bacon and eggs, and a market in Germany for similar produce as well as surplus cattle and horses. Attention was, therefore, turned to dairying as the primary industry, supplementing it with bacon and egg production. In this way her home production is calculated to have increased by about 85 per cent. from 1880 to 1917.

The population, of which the vast majority is engaged in agriculture, is considered to be the most prosperous farming community in Europe and probably in the world. The point that was first impressed on me by all authorities, was the even distribution of wealth in the country. No one is too rich in Denmark and none too poor. A typical farming community, they show unbounded hospitality to strangers, notwithstanding their highly commercialised system of agriculture. They are ever so glad to tell anyone what they have achieved and how, and, in fact, there is the least amount of secrecy and hesitation in their ways.

They are very industrious and highly cultured people living a high standard of life in an unassuming manner. Owing to the absence of big industrial towns, the people have acquired an extensive love for the soil. Their social life is in complete harmony with the natural environments. Every house has a small garden attached to it, which is always kept up very nicely by the farmer and his family, and not only enhances the beauty of it, but also helps in the economy of the home. The people have a very wholesome recreation in physical exercises, in singing folksongs and patriotic songs in periodical markets, and feast days amusements. The village schools and churches form the centres for organisation of meetings, lectures, extension courses, etc.

Farming has come to be regarded as one of the noblest professions. Two essentials for a strong country life have been fulfilled. Returns commensurate with the money and labour invested are obtained from the land, and the daily life of the farm has been made socially attractive and wholesome.

Agriculture has been put on a sound basis and farming is not a drudgery. It is practised more with the brains than with sweating manual labour. I came across a teacher, a young graduate of the Royal Agricultural and Veterinary College at Copenhagen, in one of the agricultural schools, who used to make a little addition to his earnings by working on a neighbouring farm, most of the summer, when he had only part-time lecturing work in the school.

Practically every man is brought up in agricultural atmosphere. I was told that even from the very few so-called industrial towns

XUM

many boys are sent out by their parents to spend their summer vacations with the farmers in the country.

I have seen statues erected in the open country, depicting the conquest of the land with the plough and a pair of working animals. There are agricultural-history museums situated not in the towns, but in the countryside. One of these museums which I was able to visit at Lyngby is a remarkable national collection. The exhibits consist of almost everything connected with agriculture, systematically arranged in the respective order of development. The development of various branches is very instructively explained by beautiful charts and pictures hung on the walls of a big two-storied hall. Old types of farm houses and buildings, water mills, wind mills, etc., have been bodily removed from different parts of the country and placed as exhibits on the spacious grounds included in the museum. Some of those century-old houses and conveyances bore a striking resemblance to some of our present-day farm houses and *palkees*. Attractive charts showing the organization of holdings could not escape attention. Displayed in the pottery house windows in Copenhagen, one can hardly fail to notice very beautiful China wares with coloured pictures of Danish creameries and certain other phases of farming, which are not infrequently found decorating the parlour of the farmer. All these things but point to the place a truly agricultural country has found for its farming.

The question occurs: How have the Danes achieved all this success? They are a small nation with a homogeneous population which, of course, made their task comparatively easy. The geographical position also offered a very favourable opportunity. The most important factors in the development, however, are the organization of rural and technical education, a satisfactory distribution of land and the application of scientific methods in the production and marketing of the produce.

Co-operation is the watch-word and is very closely interwoven into all the activities of Danish farming, and, indeed, has contributed very largely to the emancipation of the peasantry. That was thought to be the only way for the success and prosperity of the poor peasants and was fully taken advantage of. In the course of a talk, Mr. Herald Faber, the authority on Danish agricultural co-operation, strongly emphasized on the point that an improvement, to be real, should come from the peasant farmers themselves.

Education is the basis of all improvement. Many hold that even co-operation could not have succeeded in Denmark without universal intelligence and disappearance of illiteracy. Elementary education has long been made compulsory from 7 up to the age of 14.

Elementary schools teach the fundamental subjects, such as reading, writing, grammar, arithmetic, history, geography, singing, gymnastics, etc., but they early inculcate in the boys the love of soil tilling as a life-calling. They have steadily developed into a high state of efficiency, employing well trained teachers who are contented with their lot and very often serve a long time in the same community. They hold a high rank in society and have many chances of becoming community organisers. After the age of 14 those of the boys who intend to take up an agricultural career—a large percentage—go out to learn practical farm work. Ordinarily in most of the elementary schools arrangements are made for evening continuation classes which enable the boys to attend them while working on farms in the day time. Instruction is given in the usual subjects including Danish language. These classes are attended up to the age of 18. Then comes the unique type of school called the Folks' High School, described by some as farm-life school. These schools are characteristic of the Danish system. They began solely by private enterprise with the object of imparting culture to the peasants, and became so popular owing to the desire for education among the masses that about 100 of these schools existing to-day can hardly provide accommodation for an ever-increasing number of applicants. Their aim is to make broad-minded patriotic citizens and prepare the foundation for prospective technical education. The whole success depends upon mutual confidence and sympathy among the teachers and the students. They live in very close association and the work is based upon lectures and discussions rather than text-books. The ability of the teacher to inspire and instruct is, therefore, an important factor.

Kold, who was one of the pioneers of the movement of high schools, always taught the people to despise outward show and value the greatness of the soul. He said that because a man cleans the cattle stalls and milks, it does not mean that his soul cannot be great.

With the small-holding ownership that has been established, the Danes realise that to work successfully through co-operative efforts it is essential to have an enlightened peasantry. Here comes in the influence of the high school in making the people realise how best the interests of the individual and the nation are served by mutual confidence.

It must be remembered that all these high schools are situated in the country, and residence in the school is compulsory. Most of the folks' high schools are not co-educational. They have two separate courses of instruction, a five-month summer course for men and a winter course for women. Besides the general subjects the women are taught dressmaking, embroidery, etc. Considerable attention

is given to the physical training of all. The young people, generally of from 18-30 years of age, who come to these schools from all classes of the country population and even in some cases from the towns, live with the head master and his family. There are no examinations at the end of the course and no certificates or diplomas granted. Yet there is an increasing demand for these schools. The Danes have achieved a great success by their system of education in imparting high culture to their people without giving them a contempt for work with hands. They have ennobled manual work in the estimation of the people and at the same time increased their ability to do the work.

When the boys have had practical training on farms for at least three years and thereafter have, in the majority of cases, obtained a general training in one of the folks' high schools, they are ready to enter an agricultural school. With the exception of two, all the agricultural and dairy schools offer only a theoretical training in all the branches of the subject, variously arranged to suit the requirements of different districts. The courses are held in winter usually for 5-7 months, and intensive lecturing and discussions give a thorough instruction in scientific farming. These courses are mostly attended by men students only.

An important aspect of the education in these schools is the summer courses in household economics arranged for girls. The Danes believe that women who are destined to become the helpmates of scientific farmers must themselves understand how to manage the farm household economically and scientifically. Thus the subjects taught include cookery, needlework, painting, dressmaking, household hygiene, etc., all that are important for a housewife.

I have a very pleasant recollection of one such summer school at Haslev, where, by the kindness of the director's wife, who was also a teacher in the school, I was able to see the work going on in different classes, such as the preparation of various meat and vegetable dishes, fruit preserves and syrups, household washing, ironing, embroidering, knitting, dressmaking and ordinary and lacquer painting. It is needless to mention that music and singing form an important part of instruction in all kinds of schools. There was a fine demonstration flower, fruit and vegetable garden surrounding the school buildings.

In late years three small-holders' schools have been catering for the needs of small peasants by combining general cultural education with technical instruction. They emphasise on branches of particular interest to the small-holders and also offer short courses in various subjects.

At the present time there are about 33 of these agricultural, dairy, horticultural and small-holders' schools, each full to its capacity.

Besides, nearly 26 of the folks' high schools have agricultural subjects included in their courses. About 2,000 pupils have been attending these schools annually during recent years. Except in dairying, practically none of the schools holds any final examinations or award diplomas or certificates in agriculture, the students usually returning to their farms on completion of their training. Here again it is noteworthy that all the schools are located in the open country and form centres of rural social activities.

From the agricultural schools some of the clever students go to the highest agricultural institution in Denmark, the Royal Agricultural and Veterinary College at Copenhagen. It is one of the best of its kind in the world. It has extensive buildings, demonstration fields, laboratories, clinics and a library containing over 72,000 volumes. The courses of instruction in the college are agriculture, veterinary, horticulture, forestry, land surveying and dairying and dairy farming. The college arranges for extension courses and post-graduate work in specialised subjects. Attached to the college are an agricultural research laboratory and a serum laboratory for the manufacture of vaccines. The number of students attending the college for the agricultural course has averaged 150 for the past five years. The majority of the students passing out find an opening in State Service or become advisers, while a small proportion return to the land.

A distinctive feature of the Danish agricultural development lies in the direction of the distribution of land. The holdings in scattered strips have early been reorganised and parcelled out into suitable units. The constant need for more intensity of culture and a special desire for social equality and prosperity have continuously striven for the establishment of small holdings throughout the country.

In 1919, only about one-fifth of the agricultural land belonged to large estates, one-fourth to small holdings, and more than one-half comprised of middle-sized peasant farms. Year by year systematic efforts are being made to break up large estates and increase the number of small holdings. Hard-working young men are enabled with the help of mortgage loans to buy and settle on these holdings. That 92 per cent. of the farmers are owners of the land they cultivate is sufficiently indicative of the healthy farming conditions in that country.

A small-holder may be the owner of anything from 1 to 25 acres of land. A good many, not possessing sufficient land, work as part time labourers, but successful attempts have been and continue to be made to supplement their land to make it up to at least 15 acres, which is considered just sufficient as an independent family holding.

Milk production is the primary aim of every farmer. Breeds of cows have been evolved which give large quantities of rich milk. The

XUM

introduction of suitable fodder crops insures a regular supply of milk throughout the year, which is regularly delivered to the nearby co-operative creamery to be made into butter, and brings him cash at regular intervals. On the by-products of butter making he raises pigs and poultry which are similarly sold to the neighbouring co-operative bacon factory and egg export association.

There are over 1,335 creameries working in Denmark to-day. Very efficient power machinery is used in all these creameries. It was an agreeable surprise to hear from a responsible officer of the Danish Agricultural Society that Denmark is not only meeting its own requirements of all the above-mentioned dairy equipment, from her home manufactures, but has also an appreciable export. Thus the country has not been slow to restore a proper balance between its agriculture and industries.

The enlightened Danish small-scale farmer is able to do his work with efficient implements and machinery. In not a few farms electricity is used for driving farm machinery, and is supplied by the co-operative associations at a cheap price. With no water power for generation of electricity efforts are being made to still further cheapen the supply by bringing the water power current from Sweden.

Thousands of small-holders, as also the large owners, are thus producing their commodities at the lowest cost of production, likewise marketing them in the most profitable way.

With what intelligence the land is farmed will be apparent from the fact that an ordinary small-holder could, while showing me round his farm, easily explain to me the scientific principles underlying the fertilizing of his plots and how with the assistance of the agricultural society he had fought out a disease that he had noticed reducing the yields of his barley and oats. On another occasion I met a farmer who had failed to establish lucerne in a particular plot and was trying in conjunction with an adviser to get it established there. In this connection it would not be out of place to mention that lucerne is being widely introduced into the rotations in order to decrease the country's dependence on imported feeding stuffs.

Research work in every branch of agricultural industry is being untiringly carried on. Not satisfied with the progress made by patient work in their own country, the Danes do not fail to send their scholars for special studies abroad, wherever there are better facilities. The educational work by means of numerous shows and demonstrations has not been a little responsible for the rapid progress.

Science has come to the aid of the farmer by placing at his disposal valuable information regarding the best methods of utilizing the soil, and the farmer has been enabled to rise to the occasion. He is con-

stantly in touch with every activity concerning his industry. One of the mottoes of Danish agriculture is, " Keep close to the farmer."

ABSTRACT OF SPEECH BY MR. FALCONER L. WALLACE, PRESIDENT OF ANIMAL DISEASES RESEARCH ASSOCIATION OF SCOTLAND, AT THE 1927 ANNUAL GENERAL MEETING.

New Institute.

The Association is now in possession of a really well-equipped Institute. There is ample accommodation for investigation into animal diseases. The buildings have been so designed that there is facility for the work of the different specialised departments. At Moredun there is good stabling for horses and cattle, and there are special rooms for small animals. There are in addition seven excellent paddocks of two to four acres each.

The Association's laboratories at the Royal (Dick) Veterinary College will be equipped especially for those branches of the work which can be executed without the use of large animals.

Library.

A private donor gave £500 and the Carnegie United Kingdom Trust gave £250 for the foundation of a good library. In addition the Board of Agriculture for Scotland allow an annual maintenance grant. The capital sums have been expended and it has already been necessary to extend the shelving originally provided.

It is believed that the library is now at least as good as that of any of the other research institutes in the country which are concerned with the diseases of animals.

Indexing and Abstracting.

A very complete system of indexing the literature on animal diseases has been inaugurated, so that all that has been written on each subject may be immediately and easily available when required. The current literature is dealt with as it appears and a start has been made with the important previous work. The system has been so arranged that the regular reading of the research staff contributes automatically to it.

Librarian.

The stage has now been reached when it is necessary to employ a whole time librarian.

At least 25 per cent. of the time of a research worker is taken up in study of the literature of the subjects in which he is interested. It is essential that he be fully acquainted with the latest developments

in his branch of science. Very much fuller use can be made of his work if the less technical parts can be carried out for him.

A librarian could be of very great assistance to the investigators by maintaining the references to the literature and ensuring that everything in the library is readily available.

Committees.

Research Committee.—We have great reason to be very grateful to the Research Committee for all they have done for us. The Committee has been strengthened by the co-option of Mr. McCallum (of the Board of Agriculture for Scotland), Lieut.-Col. McKendrick (a very distinguished medical statistician) and Mr. Peggie (a well-known veterinary practitioner in the South of Scotland).

The Research Committee have given up a great deal of their time and are considering our problems in great detail. The Association is indeed fortunate in receiving the advice of such distinguished scientists and Mr. Pool has told me that he personally is very grateful to them for the help they have given. The work and time of these gentlemen is given purely in the interests of science and *pro bono publico.*

The investigations lead to inquiry into details of many very specialised subjects and it is a great source of strength that the Association is able to get help in these directions from its Research Committee.

Motor Laboratory.—A private donor has presented the Association with a well-equipped motor laboratory. A great deal of consideration has been given to the design, and it is believed that the vehicle will be as near perfection as it is possible for anything to be.

Mr. Hudlass, Chief Consulting Engineer to the Royal Automobile Club, has advised about the engineering details, and this has ensured that everything will be perfectly suitable for its purpose. We are deeply indebted to Mr. Hudlass, who, although he has had a severe operation, has greatly exerted himself on our behalf. The vehicle is on exhibition, although in an incomplete state, but it is possible to realise what an asset it will be in the work of investigating diseases in the field.

Wherever it goes it will be a perfectly complete self-contained unit.

Finance.

It is the policy of the Development Commissioners and of the Board of Agriculture for Scotland that the Association provide one-third of its expenditure, and even then the remaining two-thirds contribution from public funds is strictly limited..

It is pleasant to note that there has been a great increase in the

local income. This has chiefly been from county councils and agricultural bodies. This recognition of the Association's work is very gratifying, and it is hoped that in the ensuing year other county councils and agricultural bodies will add to the local income.

A larger maintenance grant is urgently required so that a larger staff of investigators can be employed. There is already accommodation for them and the overhead charges are nearly as heavy for a small staff as they are for a larger one. An increase in the maintenance charges under this head would increase the results obtained from the work undertaken out of all proportion.

Research.

Committees.—*Animal Diseases Sub-Committee of the Agricultural Research Council.*—This Committee meets annually to discuss the programmes of work of the different research institutes. The Association is represented and takes part in its deliberations.

Lamb Dysentery Sub-Committee of the Agricultural Research Council.—This Committee is composed of the heads of the different official institutes for the study of animal diseases. Certain field experiments have been carried out under its auspices, and it has discussed the individual work carried out by the institutes. The Association is represented on the Committee and, of course, carried out its own individual work on lamb dysentery.

Sterility Committee.—A meeting of this Committee was held in 1926, and as a result a proposal was made to the Board of Agriculture for Scotland that certain funds be given so that a start may be made with the collection of material required by the different investigators concerned. It is anticipated that the Association will undertake the pathological side of the inquiry when it has an adequate staff.

Braxy.—The following are the results of using the vaccine during the last four years :—

Inoculated.		Uninoculated (Controls).	
Year.	Percentage Mortality.	Year.	Percentage Mortality.
1923-24	4·5	1923-24	6·5
1924-25	3·4	1924-25	5·3
1925-26	3·5	1925-26	5·9
1926-27	1·4	1926-27	6·4

It is apparent that the death rate in the controls is very much lower than it is reputed to be on bad braxy farms. Many owners have such faith in the vaccine that they inoculate all their hogs, and it is reasonable to believe that as a result many of the worst braxy farms are unrepresented in the controls. The percentage mortality in the controls is thus lower than it should be. The consensus of opinion is that the vaccine is most valuable, and this would not be the case if there were not a greater reduction in the mortality than is apparent from these figures.

On the other hand there is reason to believe that in the deaths among the inoculated hogs, are many from causes other than braxy and that this raises the percentage mortality unfairly.

Since the vaccine was introduced improvements in the technique of preparing allied vaccines have been developed in this and other countries. There is need to make further inquiry to ascertain if a stronger preparation can be used safely. The time of the existing staff has been so much occupied that it has not been possible to take up this work.

LAMB DYSENTERY.—For the first time in the history of the Association it has been possible to keep sheep at headquarters in natural conditions.

Lambs were bred at Moredun specially for experiments in the artificial transmission of lamb dysentery.

The work of the past season has shown that lamb dysentery can be induced by feeding lambs on the dung of infected lambs, whereas there was failure when all the other methods of infection were employed. No further evidence has heen found for suspecting that infection occurs before birth and as the case stands at present, the only ground on which there is any reason for entertaining this hypothesis is the small percentage of cases in which death occurs within 24 to 48 hours of birth.

It has been found that *Bacillus Welchii* antitoxin confers strong immunity to lambs in most cases.

GRASS DISEASE OF HORSES.—Active investigation into this disease is in progress.

Professor A. J. Clarke, Professor of Pharmacology, University of Edinburgh, and Dr. W. G. Smith, Advisory Officer in Agricultural Botany, Edinburgh and East of Scotland College of Agriculture, have both undertaken to help in their respective spheres.

It is considered to be likely that a poison of some kind acts on certain of the nerves of the body. The whole train of symptoms suggests a definite derangement of one part of the nervous system, but there are some features which contradict this supposition.

This has raised the question of the normal physiology of the horse in some details which are in doubt. It may be necessary to undertake some work to elucidate these points, and it is hoped that with the collaboration of those who are helping in the investigation, light may be thrown on points which may help in the solution of the grass disease problem.

If I understand the position, the poison might quite easily be of bacterial origin and due to such an agency as *Bacillus botulinus* toxin, or it might be a poisonous principle from a plant or from a fungus. On the other hand, there is a possibility that in the process of digestion abnormal poisons are evolved which are responsible for the symptoms.

Mr. Pool has just returned from a brief tour in the Eastern Counties of Scotland, accompanied by Dr. Andrews, Director of the Ministry of Agriculture's Veterinary Laboratory, and by Professor Grieg of the Royal (Dick) Veterinary College, and has had very interesting discussions with them on the subject of " grass disease."

Bovine Abortion.—The Research Committee has given detailed attention to this question and has drawn up details of the lines which they think any investigation of the disease should follow. This scheme would involve the whole time of an investigator for five years and cost about £6,000.

There is a Very Urgent Need for Increase in the Research Staff.

We lack money.

Research cannot be properly undertaken in a hurry. It is necessary to proceed warily step by step and a false step will spoil a whole campaign.

There are numbers of urgent problems in connection with the diseases of animals and there is always a temptation to give a little attention to everything. If this policy is followed, it is impossible to give sufficient detailed attention to the main problems. On this account it has been necessary to take stock of the position and lay down a policy for the future. To give adequate attention to lamb dysentery and grass disease of horses with the existing staff, it has been necessary to eliminate or diminish work on other diseases.

A scheme for increasing the research staff is before the Research Committee at the moment. At present we lack the necessary money.

The Development Commissioners have asked for an assurance that the staff of the Association are able to take full advantage of the laboratory accommodation (including the motor laboratory) at their disposal. The existing staff cannot take anything like full advantage of the Association's accommodation. We lack the money to pay enough staff.

XUM

COLLABORATION WITH OTHER RESEARCH INSTITUTES.

It is hoped that in the future, close collaboration may take place between the Association and other institutes.

The work of the Sterility Committee will partly be in collaboration with the Animal Breeding Research Department of the University of Edinburgh. We hope to play our rôle in this important investigation—but there again it is a question of staff.

There is a big field for collaboration with the Rowett Research Institute in connection with the importance of deficiency in nutrition and its connection directly or indirectly with disease.

Mr. Pool has recently, in personal interviews with Dr. Orr, agreed with him upon a certain field of investigation in sheep diseases in which we can work in close collaboration. Mr. Pool is going to place this matter before the Research Committee.

MAINTAINING FERTILITY OF EGGS DURING LONG SEA VOYAGES.

BY E. MORGAN, F.R.C.V.S., D.V.H.,
Puerto Cabello, Venezuela.

THE writer was surprised to find how little was known regarding the above subject, when poultry experts in Great Britain were approached for their advice concerning the best means of conveying eggs for a period of three weeks on a sea voyage, with a reasonable hope of their remaining fertile till the end of the voyage, when they would be placed immediately under hens.

In order that readers may understand how little was known, it suffices to state that of all the answers received to such inquiries the most satisfactory one was to say that it would be worth while making a trial, and suggested placing the eggs in the usual egg boxes, to cord them, leaving a loop at the bottom and a loop on the top, and to reverse the position of the boxes every other day, hanging them in a cabin by one loop, then by the other. In this way the eggs would not be harmed by the movement of the ship.

We were informed by others that it would be "a very hopeless task to convey hatching eggs for such a long journey as it would only mean money thrown away. Only last year we sent a large consignment to Canada to our customer's order (in spite of having advised him not to do so), and while every egg proved to be fertile, he did not hatch one chick."

Having received these discouraging reports regarding the eggs, we asked the question whether it was more advisable to take young chicks instead. The answers again were most unfavourable because we were informed that we should "only lose the youngsters, as after

the first few days it is absolutely essential that they come in contact with the earth, otherwise they lose the use of their legs and eventually perish."

We thereupon decided to try to take a small pen of Rhode Island Red fowls, together with two sittings of eggs of the same breed and also the Light Sussex breed.

On February 26th we obtained 15 eggs of each breed and packed them in cardboard egg boxes. On the 28th *idem* we commenced our journey from Oswestry, via London, Harwich and Antwerp, where we embarked on the three weeks' sea voyage for Venezuela, S. America. We took all possible care in arranging the egg boxes according to the method already mentioned, but thought it best to reverse their position every day instead of every second day as suggested. When we approached the tropical zone we decided to play the electric fan on the boxes in the hope of keeping them as cool as possible under the circumstances.

Upon arriving at Puerto Cabello on March 21st, owing to some difficulty in finding broody hens, we were able to set only the R.I.R. eggs, and the Light Sussex eggs were rested until the following morning. We mention this as some poultry breeders advise the necessity of resting eggs for at least one day after a journey before setting them under hens.

The result showed that of the 15 R.I.R. eggs not one chick was hatched, but from the same number of L.S. eggs five chicks were hatched, one of which was so weak that it succumbed at the time of hatching.

Although this result is not as satisfactory as one would wish, yet it goes to prove the possibility of conveying eggs overseas and maintaining their fertility.

It must be taken into consideration the extreme change of climate which the eggs were subject to, from the cold English February weather to the tropical heat. Another difficulty met with was in procuring broody hens which had to be obtained from neighbouring places, and as is well known, broody hens do not take kindly to strange surroundings and are liable to leave the eggs.

It would appear, judging by these results, that of the two breeds of fowls chosen the Light Sussex type is the hardier, and more able to withstand the difficulties of transit, unless the difference of one day in setting the eggs under the hens accounts for the difference in the number of chicks hatched. Both sittings had equal chances, for although being obtained from different sources, they were guaranteed by well-known poultry breeders to be fertile.

Perhaps a few words regarding the pen of R.I.R. fowls which we

brought will be of interest. In addition to six hens we took two roosters, so that in the event of losing one we should still have an opportunity of breeding from the second, which eventually proved to be the case. Somewhere between the Azores and the coast of Barbados on March 12th, we discovered that one of the roosters had suddenly died, presumably on account of the extreme heat, although at Antwerp our attention was called by a gentleman experienced in shipping fowls to the fact that one of the roosters was pecking at a hemp rope attached to the pen, and we were advised to remove the rope as he had had losses on board owing to fowls eating this class of rope and becoming crop bound. Steps were immediately taken to remove the danger, but unfortunately this rooster had already consumed a portion. Unfortunately, owing to a misunderstanding, the fowl was thrown overboard before a *post-mortem* examination could be made, so the cause of death can only be attributed to one of these two named causes.

Apart from this loss, the pen of fowls arrived safely in Puerto Cabello and ultimately became acclimatised.

We learned while on board from the captain and chief officer that the main difficulty met with in conveying fowls across sea was in avoiding the salt spray in rough weather, which affected their eyes, often resulting in complete blindness. In order to avoid this the captain very kindly arranged for a sheltered position to be fixed on his deck, where the fowls had every advantage and every attention from the captain down to the cook's boy; in fact, they were nearly killed by kindness, as was easily seen by the way the roosters used to greet the captain at four every morning. "More certain is the crowing of a cock to numbered hours than is the abbey clock."

Clinical Articles

AN ATTEMPT AT THE PREVENTION OF EQUINE INFLUENZA AND THE CATARRHAL GROUP OF EQUINE DISEASES IN GENERAL.

By CAPT. C. S. NORTHCOTT,
Royal Army Veterinary Corps.

THE following is an outline of a method of prevention of equine influenza and the catarrhal group of equine diseases in general which has been under trial at No. 3 Remount Depot, Arborfield Cross, during the past four months.

In view of the certain degree of success that has so far been attained with the method, this preliminary report is published. A further report with a record of cases treated will follow in due course.

(*a*) METHOD.

THE treatment consists of the intratracheal injection of 5 c.c. of a weak solution of iodine (iodine, 1 ; potassium iodidum, 5 ; distilled water, 200).

The technique of the operation need hardly be described beyond mentioning that—

(1) The usual aseptic precautions attending intratracheal injections are observed.

(2) Care is taken to avoid injection into muscular tissue at the seat of the operation, as this is likely to be followed by abscess formation.

(3) The needle is inserted between the cartilaginous rings of the trachea.

(4) The needle used is of the trocar and canula type, i.e., Dieckerhoff's syringe and needle for intratracheal injections. The lumen of an ordinary hypodermic needle is liable to become blocked by a piece of skin or cartilage.

The needle actually used by the writer is short and strong, one and a half inches in length, with a lumen of one-eighth of an inch in diameter, its point trocar-shaped (i.e., being three-sided), and the hole for exit of the fluid on the side of the needle half an inch from its pointed extremity (*vide* diagram). This needle is adapted to the 5 c.c. hypodermic syringe.

(5) The iodine solution is warmed before use and injected slowly.

(*b*) RESULTS.

(*a*) In a batch of 200 animals treated, 44 only developed the disease within 10 days of arrival, and a further 20 within a month of arrival, whereas of 20 controls kept, 16 developed the disease within the first 10 days and all except two within the month.

(*b*) In cases which developed the disease in spite of the inoculation treatment, it has been found that the severity of the attack has been greatly modified. For example, the average period of days sick in the animals subjected to the inoculation was 25, whilst the average period days sick in the controls was 36.

(*c*) The inoculation resulted in the entire prevention of the disease in a large number of the animals (136). Slight catarrh with little or no elevation of temperature has become common and severe cases with high fever and consequent loss of condition have become rare. No deaths have occurred where the inoculation treatment has been applied before the onset of any symptoms of the disease.

(*d*) The beneficial effects have been more pronounced when the inoculation has been made in the earlier stages of incubation of the disease.

XUM

The percentage of sick amongst young remount horses after arrival has consequently been reduced.

Also the number of days an animal is sick has been considerably reduced.

(*e*) As a curative it has had a fairly good effect, more especially if modified by being used in small continued doses. In such cases it has appeared to prevent such complications as pneumonia, but not absolutely so, one death having occurred as the result of pneumonia supervening in a horse that arrived in the Depot in poor condition and affected with catarrhal fever.

(*f*) A repetition of the dose in 50 horses seven days after the first inoculation resulted in no form of the disease developing in these animals within a month.

In view of the success obtained by the application of this method of treatment its employment is being continued to all horses that arrive (at the same time as Malleining) involving very little extra trouble.

(*g*) The expense of this inoculation treatment is infinitesimal compared with the results obtained from its application.

(*h*) No untoward results have occurred from the employment of the treatment.

It is a common occurrence to find 15 to 20 per cent. of remounts arriving at this Depot affected with one or more of the catarrhal group of equine diseases. Furthermore, fresh cases continue to occur from day to day until virtually practically all these animals become affected within a month.

The effect of the inoculation treatment is to prevent not only an increased severity of the disease with which the animals are affected on arrival, but also its spread amongst the whole batch of animals.

A CASE OF OSTEOMALACIA IN AN ARAB RACING PONY.

By MAJOR K. HEWLETT, O.B.E., M.R.C.V.S.,
Indian Veterinary Service, Principal Bombay Veterinary College, India.

SUBJECT.—An aged grey Arab entire, "White Boy." Had been raced in Bombay and Poona for the last five or six years.

HISTORY.—Had four months previously met with an accident from a collision with a motor car, when he received a wound about three or four inches long on the off shoulder, which healed uneventfully. Since the accident he had been idle in the stable or received walking exercise only. On August 16th, 1927, the animal was at walking exercise on the sands when (the syce reports) he stumbled and immediately became very lame, being unable to place any weight on the off fore limb. After some delay the animal ambulance arrived

and an attempt was made to walk the animal into it, but this having failed an attempt was made to forcibly back it in. The animal fell and was then pulled in while down. On arrival at the hospital the animal was put in a loose box and an attempt made to sling it, but this being found impossible, it was allowed to remain in a recumbent position, as it was obvious that death was imminent.

The *post-mortem* examination was made on the 17th instant at 10.30 a.m., and the following was observed :—

The humerus of the right side near its proximal extremity was fractured into innumerable small pieces—the whole bone between internal tubercle and the articular head being completely crushed. The humerus of the left side was obliquely fractured in the musculo-spiral groove and much displaced. The shaft of the femur of the right side was fractured obliquely into four pieces. Around the above fractures there was considerable hæmorrhage and laceration of the tissues. All the asternal ribs of both sides were fractured extensively, and in some cases in two or three places. The ribs were soft and could be bent and fractured by the hand with ease. The scapula was soft and easily penetrated by a slight blow with a hammer. The skull bones were also soft.

The bones were not noticeably deformed in any way.

The internal organs were normal with the exception that the lung of the right side had been lacerated by a fractured rib and emphysema of both lungs was present and the heart was slightly dilated.

The above appears to be a case of osteomalacia, although that condition is a rare disease here, and most cases that have come under observation previously have been accompanied with some deformity of the bones. The sudden and complete collapse of the skeleton in this case is very remarkable.

STRONGYLUS VULGARIS IN AN ABSCESS ON THE CORONET.

By R. HUDSON, F.R.C.V.S.,
Retford.

THE subject was a four-year-old shire colt in fair condition, but had been poor during the winter.

He had been lame for five weeks and the owner, finding an enlargement on the front of the near hind coronet, had clipped and blistered it.

The lameness had gradually increased, also the swelling on the coronet. When seen by me the colt was in a grass field and the leg was soiled with dry mud from the drinking place. There was a

prominent swelling on the front of the coronet which was painful on pressure, fluctuated slightly and was evidently causing lameness.

Having scraped out his foot and searched for trouble at the toe, I found nothing, nor did he flinch when tried with the hammer round the foot, except slightly high up on the hoof below the swelling.

It has been my practice for some years to incise such enlargements over the *full* extent of the abscess cavity, plug with *tow* or wool soaked in a strong solution of ac. carb., wait a few days and then carette them, plug daily and later syringe out.

On this same farm I lost a mare from acute septicæmia about the third or fourth day after operating on a similar enlargement, so I was now more careful about preparing the foot for the operation.

I scrubbed and washed the leg and foot with a bucketful of strong lysol solution, the water and bucket having been obtained from the house.

Having done so, I noticed, on examining the enlargement, that a drop of blood-like fluid had exuded, and having placed the colt on a patch of clean grass in the stockyard pushed in the bistoury and incised it about one and a half inches.

Proceeding to examine the wound I found a worm within the edges and a small quantity of granular lymph-like material escaping.

The worm was quite fresh and unshrivelled and looked like a *Strongylus armatus*. I forwarded it to Mr. A. W. N. Pillers, who kindly sent me the following report :—

"The worm is an almost adult female of *Strongylus vulgaris*. This is one of the three species usually included in the old term, *S. armatus*. It is the cause of verminous aneurism of the anterior mesenteric artery. The clinical history would seem to suggest that the worm and some of the aneurismal deposit were carried to the near hind coronet at the commencement of the lameness.

"The specimen sent by Mr. Hudson is 18 mm. long and differs only from the adult (23 mm.) by its length, the absence of eggs and a few minor details. The buccal capsule is full of material closely resembling blot clot. The aneurismal forms of this species usually measure about 15 to 17 mm., and the anterior extremity is not nearly so fully developed as in the present specimen."

I had the wound syringed out twice daily with carbolic lotion and the patient placed in a clean yard. He gradually became sound and was back at work in about three weeks.

I am quite sure the parasite did not enter the wound from outside. The leg was well cleaned and the place where I carried out the operation was unfrequented by horses.

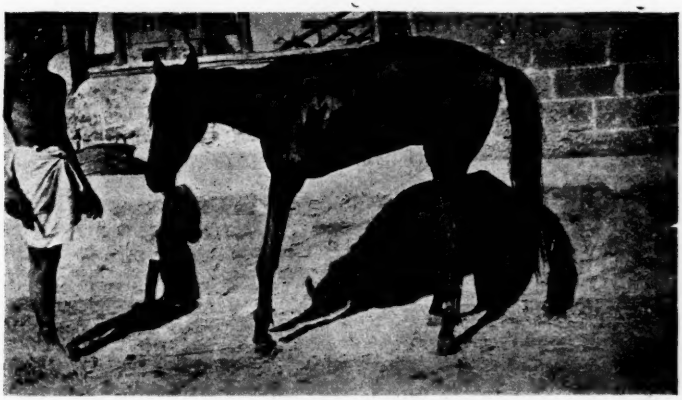
The fæces have been examined on several occasions, but no *Strongylus vulgaris* found in them.

FREAK OF NATURE—A THREE-LEGGED COLT.

By C. S. G. HAJI, G.B.V.C.,
Veterinary Inspector, Civil Veterinary Department, Lower Sind Circle, Karachi, India.

As I cannot find that a freak of nature of this kind has been recorded, this photograph may be of interest to the members of the profession.

The subject is a brown country-bred colt, foaled in September, 1925, in a village near Matli, in Hyderabad (Sind) district. Both the sire and dam are quite healthy and this is a first foal.



Freak of Nature—A Three-legged Colt.

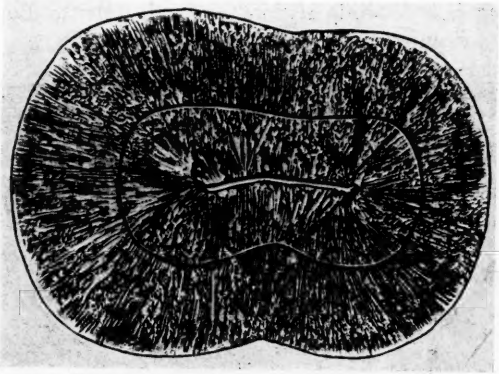
The entire near fore limb below the scapula is absent. There is a small fleshy growth attached to the skin over the scapula ridge. The owner refused to have the foal destroyed at birth and it was sent to the Karachi Zoological Gardens, where it remained for some months. The animal is now able to stand for only a very short time, and is now in a Panjrapole, a charitable institution run by Hindus, for old and infirm animals.

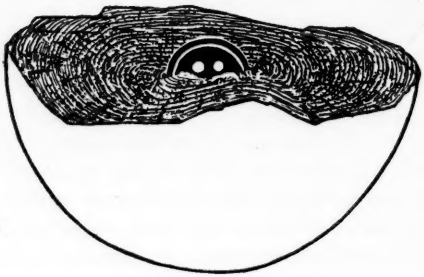
INTERESTING NUCLEI IN INTESTINAL CALCULI.

By W. G. BURNDRED, M.R.C.V.S.,
Hanley.

THE cylindrical calculus, section of which is illustrated, was removed from an aged cart mare during life. The animal was found one morning in great pain, having broken loose in the stable and nearly demolished the stall. She was removed to a loose box, and treated all day, but got appreciably worse. Hope of recovery had been abandoned, when at four o'clock in the afternoon, the mare started to strain violently with all four legs together, and a strenuous exploration of the rectum

resulted in my touching the calculus. After several attempts it was removed, after which the animal immediately became easy and made a good recovery in due time. The nucleus was a piece of wire and it is interesting to note that from the shape of the stone that there are really two calculi, one starting growth from each irritating point of the wire.





The other calculus was removed *post-mortem*, and was broken to illustrate to my client that there would be an irritant nuclei in the centre. This proved to be a trouser button which we found firmly fixed in one half of the stone.

THE ERADICATION OF BOVINE TUBERCULOSIS AND JOHNE'S DISEASE FROM THE ISLAND OF GUERNSEY.

By Capt. E. J. LAINÉ, M.C., M.R.C.V.S.,
Guernsey.

It is practically certain that 30 years ago this Island was free from Tuberculosis. About that time the American veterinary surgeon who had tested hundreds of animals for the States and found no reactors, advised his government that the test was unnecessary and that the Island was free. For some time the animals bought in Guernsey for America were allowed to be exported without any tuberculin test.

At the early part of this century it was fashionable to send animals to various English shows from which they returned laden with honours and, as we were later to find out, with tuberculosis. This condition went on for some time until eventually a buyer of two heifers insisted on the test being applied, and one reacted. Soon afterwards a number of animals were bought by an American from the same farm and subjected to the test. Most reacted, but the farmer insisted on their being exported to the States, where they were again tested, and those which reacted on the Island reacted there.

Drastic laws were then passed. No animal could, or can now, leave one farm for another without a veterinary certificate showing it has passed the tuberculin test. In the event of a reaction, or even suspicious reaction, the animal must immediately be destroyed or isolated as the case may be and the remainder of the herd tested by the State's Veterinary Surgeon. All reactors must be destroyed and no animal be removed from the farm till it has passed the test four months later.

A few months ago similar laws were passed with regard to Johne's disease and we hope to eradicate this scourge as we have tuberculosis.

The effect on the health of the human population has been astounding and the thanks of the Island are due to Mr. Foote, the late Major Whitfield and Dr. Draper Bishop, who through very strenuous years continued to apply the test with such thoroughness that we can now say we are free from tuberculosis.

Although free, we still continue the testing as before and apply all preventive measures just as when the disease was prevalent.

It is obvious that the eradication of this scourge from England must be a greatly more difficult problem, but introducing imperfect tuberculosis laws does not help in the slightest. It is possible that only udder-affected animals give tuberculous milk, but they certainly are not the only ones that transmit the disease through the milk.

As far as I can find, no animal has ever been found with tuberculosis of the udder in Guernsey, but with the eradication of the disease in bovines the existence of the human form has decreased to such an extent as to be unbelievable.

Some 20 years ago I had the privilege in helping the late Lord Rayleigh to eradicate the disease from his herd. He, not in my time, succeeded and so can any British farmer. The community should insist on it. It not only safeguards the public, but enhances the value of the herds.

As your laws stand to-day I take it that an animal must be capable of infecting dozens before it can be condemned. We in Guernsey act on the principle that an animal *must be destroyed* before it can infect another; and, indirectly, human beings.

A VERY INTERESTING CASE OF STRYCHNINE POISONING IN A PUPPY.

By MAJOR LESLIE LYNES DIXSON, M.R.C.V.S.,
Racing Director of the Greyhound Racing Association, London, W.

A SHORT time ago I was called by a dental practitioner to see a crossbred terrier puppy, four months old, which was stated to be in a fit.

On arrival I found the puppy on its side and twitching violently, and I at once suspected strychnine poisoning, but my dental friend laughed at the idea as he said the puppy had never had any medicine and never been out of his sight. Also that he had no preparation containing strychnine in the house.

Being quite certain, however, of my diagnosis, I administered apomorphine and chloral, and in about two hours the patient recovered. The interesting part, however, is the way in which we discovered the source of the poisoning. After a lengthened inquiry I could not shake my client's statements regarding having had no strychnine in his place, when it struck me to ask who had been to visit him that afternoon. I found that he had had a friend to tea who had nursed the puppy during the tea time and had played with it as one does with puppies. We telephoned to him and, at my suggestion, asked whether by chance he was taking Easton's Syrup Tablets as a pick-me-up. The reply was immediately in the affirmative and that he carried them in the ticket pocket of his coat in a paper envelope. He said, too, that he would go upstairs and examine the ticket pocket of the coat which he had on the day he came to tea as the tablets ought to be there. He then returned to the telephone and said that the envelope was missing. Upon this my dental friend and myself searched around the workshop (where they had had tea on that afternoon) and found, under the bench, a chewed envelope with two Easton's Syrup tablets still in it.

What had happened had been that the puppy had, whilst playing, put its nose into the ticket pocket and extracted the envelope, swallowing one or more of the tablets, thus causing the poisoning. I publish this partly to illustrate the necessity for perseverance in following up a clue, and partly to encourage the young graduate not to be ridiculed out of his diagnosis by the seemingly impossible condition brought about by the emphatic denial of an owner.

A CLINICAL NOTE ON HABRONOMIASIS IN AUSTRALIA.

By I. CLUNIES ROSS, B.V.Sc.,
Veterinary Parasitologist, Council for Scientific and Industrial Research, University of Sydney.

THE recent report by Le Soeuf and Weston of a case of epithelioma

of the stomach of the horse associated with the presence of habronema, has directed attention afresh to this infection in Australia. Some idea of the importance of habronemiasis to the Australian horse industry may be derived from consideration of the opinion of competent observers such as Allen, who estimates that 60 per cent. of debility cases in Australian remounts arriving in India are due to this cause, and only 20 per cent. to constitutional causes.

Clinically, habronemiasis may be considered firstly in the light of the lesions and symptoms caused by the adult worms, and secondly those caused by the larvæ. The adult worms, of which three species are of common occurrence throughout the whole of Australia, are found in the stomach, two species *Habronema microstoma* and *Habronema muscæ*, occurring on the gastric mucosa, while the third species, *Habronema magastoma*, is more deeply situated in fibrous nodules in the sub-mucosa. The presence of the first two species appears to give rise to a mild but persistent irritation of the gastric mucous membrane which is associated with a catarrhal condition of the gastric glands. As a result the reddened mucosa is frequently found to be covered by a thick glutinous mucous deposit in which the worms are embedded, in heavily infested cases forming a felt-like mass.

Unlike the other species, *Habronema megastoma* burrows into the gastric glands and this causes an inflammatory fibroblastic reaction which, when prolonged, leads to extensive nodule formation. From the depths of these nodules, one or more burrows lead to the surface of the mucosa and on pressure *post mortem*, large numbers of worms may be expressed. Though in the majority of cases the inflammatory reaction only involves the sub-mucous tissue, in some it may extend deeply to involve the muscular wall, while invasion with pyogenic organism may lead to the formation of considerable abscess cavities.

Where abscess formation occurs it is not uncommon to find penetration of the entire stomach wall and adhesions with the diaphragm or other viscera, with the encapsulation of the septic focus alone prevent a possibly fatal peritonitis. In such cases there is, however, very great risk of rupture of the weakened muscular coat from any cause to leading to dilation or strain of the stomach. In Victoria, splenic abscesses of habronemic origin have been reported.

Symptoms.—From the lesions described it may be expected that the symptoms of habronemiasis would be those of any chronic inflammatory condition of the stomach and might thus be likened to those ill-definable and unsatisfactory indications described as characteristic of chronic gastric catarrh which are too well known to need description here. For the practitioner it becomes a question of whether

he is justified in assuming, after as far as possible eliminating other predisposing causes, that all cases of gastric catarrh are of habronemic origin. The answer to this question must largely depend on local conditions. Thus in England such an assumption would be quite unjustifiable, while in Australia, on the other hand, it might be largely justified in view of the extraordinary and widespread prevalence of this infestation. Thus Bull and Hill found that over 90 per cent. of horses, subjected to *post mortem* examination in South Australia and Victoria respectively were infested, while the writer found over 80 per cent. of horses at the Sydney Veterinary School clinic to be similarly affected. It must be admitted, however, that in each case the horses for the greater part were old and worn-out animals.

DIAGNOSIS.—If the clinician desires accurate diagnosis of the suspected condition it might be expected that ordinary fæcal examination by the employment of one of the common flotation methods would readily reveal the presence of the characteristic small thin shelled embryonated eggs. Such, however, is not the case, and ordinary methods of fæcal examination are valueless for this purpose. One other possible method remains, and this consists in the pumping of a warm one per cent. solution of sodium bicarbonate into the stomach by means of the stomach tube, and then shortly after syphoning off again. The alkaline solution tends to dissolve the mucous deposit in which the habronema of the stomach wall are embedded and these may then be washed off the mucous membrane and will be recovered by sieving the stomach contents as these are drawn off. Preliminary starvation and a first washing to remove the bulk of the ingesta present will be found to facilitate the process. This method of diagnosis has the drawback that in addition to necessitating the passage of the stomach tube, to so many veterinarians, with its danger of hæmorrhage from the turbinated bones, an unpleasing operation, it would not be likely to give positive results where infestation is by *Habronema megastoma* alone, since these worms, situated in the depths of the nodules, would be unaffected.

TREATMENT.—Granted that habronemiasis has been diagnosed or is suspected, what line of treatment may be recommended? The testing of drugs against these parasites is complicated not only by the difficulty of definitely determining their presence prior to treatment, but also from the fact that any worms killed by the treatment would be digested by the gastric juices and would thus not be found by subsequent fæcal examination. Hall considers that ol chemopodium or carbon tetrachloride from their action on other hematodes would probably kill those worms with which they come in contact on the mucous membrane, but would not be likely to reach those within the

nodules. In two cases treated by the writer with carbon tetrachloride no *Habronema microstoma* or *Habronema muscæ* were found on *post-mortem* examination, though *Habronema megastoma* was present in each case. The administration of a course of arsenic, either as powders or in solution for a considerable period would possibly prove of value against this latter species, since small quantities might ultimately penetrate the nodules, and Allen has observed great improvement in the condition of horses first treated with an anthelmintic drench and then given a course of arsenic in daily doses of from 10 to 25 grains.

Larval Habronemiasis.—In considering the effects caused by the larvæ of habronema it is necessary to remember the salient features of the life-cycle of the parasite. After the passage of the embroyonated eggs in the fæces, the larvæ either actively or passively make their way into the larvæ of certain flies, of which the common house fly and the stable fly *Stomoxys calcitrans* are of primary importance, the first species being the host of *Habronema megastoma* and *H. muscæ*, and the latter of *H. microstoma*. In Australia Harvey Johnston and Bancroft have found that numerous other species of bush musca may serve as intermediate hosts. After gaining access to the body of the fly larvæ, the young worms undergo a complicated course of development which is ultimately completed in the imago or adult fly. They now make their way to the proboscis of the fly, and on such an infested fly feeding on moist warm surfaces there is spontaneous escape of the larvæ on to the mucous membrane or wound surface on which the fly is feeding. In the case of *Stomxys calcitrans* normally a blood sucker it has been found that the presence of the larvæ prevents the fly piercing the skin and so obtaining food in the normal way, so that it is reduced to sucking up juices from the same surfaces as muscas. These larvæ which escape on to the mucous membrane of the mouth and are swallowed and reach the stomach, develop to maturity, but the others soon die after first giving rise to the lesions on which their clinical importance depends. It has been found that prior to death the larvæ tend to burrow into the surface on which they have escaped and the irritation they occasion results in the formation of granulomatous growths the nature of which varies according to the tissues affected. Bull found larval remains in lesions on the external genitalia of horses in South Australia, the growths in question being of a firm fibrous nature. Lewis and Seddon in Victoria were able to demonstrate larvæ in soft granulomatous growths on the conjunctiva of horses, and the frequency with which growths of the conjunctiva occur in other Australian States is noteworthy. In other countries habronema have been credited with causing the cutaneous lesions known as Summer Sores, and condition simulating these has been

XUM

produced experimentally by Roubaud and Descazeau, though their importance in this connection has recently been question by Freeborn, Hart and Howell. In Australia the lesions definitely attributable to habronema larvæ in the horse appear to be more or less restricted to the gland penis, prepuce and conjunctiva. Bull has suggested that the common conjunctivitis in man so common in inland Australia in the summer months and popularly known as bung eye, is caused by the accidental escape of habronema larvæ on to the conjunctiva, and in support of his contention he was able to demonstrate the typical histological structure in one case of granuloma of the conjunctiva of man. It is considered that the granulomatous growths arising on wound surfaces may, in certain instances, arise from the same cause. The heavy degree of infestation of flies which may occur in a given area was strikingly shown by Harvey Johnston and Bancroft, who found over 33 per cent. of flies captured in a Brisbane stable to be infested with harbonema.

Habronematous granulomata of the membrana nictitans or conjunctiva may be differentiated from true cancerous growths by the fact that growth is rapid for a short period of two or three weeks and then tends to become stationery, whereas in the latter condition there is relatively slow initial increase, but extension persists and may involve the deeper tissue of the eye and arbital cavity. It is not unlikely, however, that the parasitic granuloma may, in certain cases, assume a malignant character in the same way that lesions caused by the adults may lead to true neoplasm formation.

Control of Habronemaesis.—From the facts cited in connection with the life cycle of the parasite it will be seen that the continued spread of the disease directly depends on two factors, namely, the prevalence of flies in the vicinity of horses, and their accessibility to horse fæces for the deposit of their eggs. Control, therefore, becomes above all a hygienic measure, since it has been seen that treatment by the destruction of the adult parasite within the host presents certain difficulties. In towns, or wherever horses are stabled, control is to a considerable degree practicable since efficient fæcal conservation can be carried out. Fæces should be regularly cleared from all stables, horse lines and yards at least once a day, and should then be stored so that (1) flies can no longer obtain access to them and (2) so that any fly eggs or larvæ already deposited will be destroyed before reaching maturity. Both these provisions may be met by any of the following methods. Manure may be stored in fly-proof manure boxes, for preference being rammed down each day, so that the fermentation set up will destroy all fly larvæ. A window may be set in one corner of the roof of the box leading up into a fly trap, so that any flies

finding their way into the box or escaping destruction as larvæ may be caught. Roubaud suggests that where manure is stored in the open all fresh manure should be added to the centre of the heap where fermentation is active, while the old dry manure on the surface will no longer be attractive to the flies for oviposition. Again the military method of conservation consists in the construction of a symmetrical block of manure with wide base and sloping sides, all additions to the heap being beaten down hard with shovels. To ensure that any larvæ escaping destruction and crawling out of the manure to pupate in the ground are destroyed, the earth surrounding the pile is saturated with wood preserving oil. Yet another method of conservation consists in spreading manure over wire netting frames, suspended over water, since it is known that fly larvæ crawl downwards out of the manure to pupate in the ground and they thus fall into the water and are drowned. While one or other of these methods of fæcal conservation may be made applicable to suit practically any case in town or city, the question of control in country districts where horses are running in large paddocks, hundreds of acres in extent, becomes much more difficult, in view of the fact that many species of bush flies may serve as carriers of habronema. Indeed, it is hard to suggest practicable measures, and one can only resort to periodical treatment by anthelmintics of horses in work, as a means of temporarily assisting obviously affected animals. In addition to fæcal conservation, fly traps should be placed in all stables, yards and horselines by which means alone a striking reduction in the number of flies may be effected and thus apart from lessening the danger of habronema infestation, confers great benefits by decreasing the ill effects of irritation and the expenditure of nervous energy resulting from fly attack. That this latter factor alone may produce a marked improvement in the condition of remounts has been proved in both British and United States armies. It is to be hoped that increasing appreciation on the part of veterinarians of the importance of flies as carriers of disease to horses as to man, and of the prevalence of habronema infestation in Australia will gradually make the pile of loose uncovered manure so commonly seen in otherwise well conducted stables a thing of the past. That this will do much towards improving the general condition of horses in towns, as also of mitigating the increasing dislike and distrust shown by the municipal authorities to stables within the city boundaries is undoubted.

TUBERCULOSIS IN DAIRY COWS.

In regard to the prevalence of tuberculosis in dairy cattle, the following quotation from the Report of Mr. Parker, F.R.C.V.S., the

Chief Veterinary Inspector for Newcastle-on-Tyne, illustrates the extent to which this still prevails.

Mr. Parker writes: "On examining the carcases and internal organs of 167 cows sent into the city for slaughter for food purposes, lesions of tuberculosis were found to be present in no less than 137, i.e., 82·3 per cent."

A NOTE ON THE TREATMENT OF STURDY IN CATTLE.

By W. TOPPIN HEWETSON, M.R.C.V.S.,
Brampton.

I consider if an operation for sturdy is to prove a success that it is most important to stop the hæmorrhage before piercing the skull, because if blood gains access to the brain cavity it most readily undergoes putrefaction, giving rise to inflammation of the coverings of the brain. The hæmorrhage can best be stopped with a hot iron. When the hydatid is pierced, it is not always easy to draw out the cyst covering. I used to make notches in a split quill, introduce it through the canula or hole and give it a few turns round, and sometimes, not always, I managed to get a portion of the cyst and by gentle traction removed the whole.

I find that by notching with a pair of scissors the barbed end of the quill, the feather portion, and introducing this through the hole and turning it round once or twice it will take up the cyst covering much more surely than the notched quill, or even an instrument for the purpose and with far less likelihood of injuring the brain tissue. Before I tried this method I could not believe it would answer the purpose. Before introducing the feathery end through the opening, or through the canula, it should be dipped into spirit to asepticise it and it should be shaken or drawn through the fingers to remove the superfluous liquid, otherwise it might carry too much fluid into the cavity and this might prove detrimental.

AN UNUSUAL LAMBING CASE.

By W. TOPPIN HEWETSON, M.R.C.V.S.,
Brampton.

A crossbred ewe, in lamb, when due appeared dull, listless and laid about. On close examination all the symptoms of lambing were present; the udder being enlarged and containing milk; the labour pains were also present, but they were weak. There was a red-coloured discharge coming from the vulva. On the hand being passed into the vagina it was found that the os uteri was still closed. So nature was left to take its course. The ewe continued to lie about and refused

to eat any food. So treacle, milk and oatmeal gruel mixed was put into her three times a day. In time the straining and discharge ceased, and in about a week she began to walk about and nibble a little grass, and gradually recovered. This occurred in April. Some weeks later, in June, the ewe was brought in with the herd to be clipped. She was then found to have an enlargement in the region of the navel, and the owner suspected a rupture. About a week later the enlargement was noticed to be very much less, the supposed hernia having burst.

On introducing the finger through the orifice, a leg of a lamb could be felt. So the opening was enlarged and a fully developed lamb, covered with wool was drawn through. The owner fully expected that the bowels of the ewe would follow, but as nothing else made its appearance the cavity was washed out with a disinfectant daily for a few days. The wound healed in a comparatively short time. The ewe recovered, grew fat and was sold to the butcher.

RAREFACTION OF THE PEDAL BONE.

By Lt.-Col. H. C. DIBBEN,
Royal Army Veterinary Corps.

For some years a condition of the pedal bone has been noticed that is not without interest.

It is associated with cases of ringbone, sidebone, navicular disease and obscure foot lameness.

It takes the form of rarefaction of the bone at the heels and wings. It varies in degree from presenting a slight roughened area on the solar surface at the heels to affecting the complete wing.

In advanced cases the foramen in the wing is broken down and becomes a mere notch. The edges of the porous cavities caused by rarefaction are sharp and brittle and present a rasplike surface that could quite conceivably cause acute lameness.

Post-mortem examinations have shown this condition invariably present when ringbone, sidebones and navicular disease are found and consistently so in cases of foot lameness, the cause of which is obscure during life.

AN INTERESTING LARYNGOTOMY.

Subject.—A weight-carrying brown hunter gelding. This horse made a fairly bad noise. The owner was very anxious to win the heavyweight race of the local point-to-point, but did not want to have the horse tubed. The horse had run twice before the operation and was second once and third once, running in almost the same company each time. He could not quite go the distance and was only beaten towards the end of the race. We suggested to the owner to have the roaring operation performed. He agreed. Professor Hobday came down and performed the operation. The horse was

undoubtedly improved, and the following year he won the heavy-weight race by about 15 lengths, and the owner, who was riding him, said he did not have to ask him to go. He beat the same horses which had previously beaten him.

Abstracts of Current Literature

MacCluskey, Lucille, and Eichelberger.—The Effect of Injections of Sanocrysin on Normal and Tuberculous Dogs.—*Am. Rev. of Tb.*, Vol. XII, No. 4, December, 1925, ex *Rev. de la Tuberculose*, October, 1926.

In a first memoir the authors study the action of sanocrysin on the normal dog. Intravenous injection of sanocrysin, in the doses used, causes diarrhœa, oliguria, vomiting (doubtless by affecting the nerve centres); the vomit does not contain gold. The injection has no effect on temperature.

Three to five per cent. of gold is eliminated by the stools in the first eight days. In the urine gold appears 30 minutes after intravenous injection and is eliminated for 30 consecutive days. Urine is the chief eliminating factor with this drug (60 per cent.). The cypher of urea, chlorides and creatinin is diminished.

In six cases albuminurea appeared. This increases with the dose of the drug, lasts four to ten days and may reappear later on. The highest gold figure found in the organs has been 32 per cent.

Selter, H.—Susceptibility to Tuberculin and Action of Tuberculin.—*Zeitschrift f. Tuberk*, Vol. XLV, No. 1, 1926, pp. 11-27.

The essential element in the susceptibility to tuberculin is the exaggeration of the inflammatory aptitude of the tissues. Tuberculin excites an inflammatory state in predisposed tissues. This action of tuberculin is not specific, for other substances which cause "reactions" act on tissues sensible to tuberculin in the same way as these and excite like it inflammatory reactions that clinically, histologically and biologically cannot be distinguished from reactions due to tuberculin itself. On the system free from tuberculosis, tuberculin has the same power of exciting reactions as on the tuberculous system, but the reactions are much weaker. Do the intestinal bacteria perhaps sensibilise the system to bacterian proteins, whatever these may be, and do they exaggerate the inflammatory aptitude of the tissues in a non-specific way?

Two explanations can be given for the relative susceptibility of tuberculin; either the pre-existing susceptibility respecting bacterian proteins has been increased by the fact of a tuberculous infection, or the susceptibility to tuberculin is created extemporaneously by the tuberculin itself. Other infections like syphilis or glanders show in this respect analogous considerations. Which of the two proposed

explanations is the good one? If tuberculous infection only increases a pre-existing susceptibility, the tuberculin reaction can no longer be considered as specific, for such increase can also be brought about by infections other than tuberculosis. However, the reaction to tuberculin preserves all its diagnostic value, because practically the causes that disturb its results are rare, easy to interpret and recognise. The tuberculin reaction in tuberculosis is like the Wassermann reaction in syphilis, in spite of causes of error, the practical utility of these reactions is incontestable.

Frei, W. Dr., Stäheli, A., and Kolb.—Therapy of Anaphrodisia.—*Deutsche Tierarzt. Woch,* October 23rd, 1926.

THE following is interesting as showing the varied causes of sterility and the measures taken to overcome it.

The persistent yellow bodies were manually enucleated in 87 cows. The ovarian cysts in 10 affected animals were crushed.

Of 36 cows with other anaphrodisiac causes, nine had ovarian massage, nine received vethormone, 14 had ovary implantations, and four were treated with cantharides. Special treatment of the uterus or cervix was intentionally avoided. The results were as follows:—

(1) CORPUS-LUTEUM ANIMALS.—Œstrum occurred in two to eight days after enucleation in 56 cows. A connection between the result of enucleation as regards œstrum and the time of the year of the last parturition was not established. In 26 the last calving was in the March to September period, in 30 between October and March.

Twenty-three cows were treated once, 24 twice, four three times and five four times. Of the 33 cows treated more than once 19 gave 18 to 20 litres of milk daily.

Œstrum occurred in 29 cows after more than eight days. No œstrum occurred in two cows, despite enucleation. Conception occurred in 68 cows (out of 87 affected with persistent corpus-luteum). Also here no difference could be observed between the cows (34) which had last calved in the summer and those which had last given birth in the winter (34). Conception did not occur in 18 cows. Of these 10 had last calved in the summer and eight in the winter. In one animal no information as to the result of treatment could be obtained. The successes of enucleation of the persistent yellow bodies are, therefore, round about 100 per cent. as regards return of œstrum, but only about 80 per cent. as regards conception. The 100 per cent. return of œstrum shows that this is only actually hindered through the presence of yellow bodies in the ovary. The absence of fruition in somewhat more than 20 per cent. of the treated points to uterine causes of the aconception (endometritis). By treatment of the uterus the successes would probably be greater.

(2) CYSTIC ANIMALS (10).—Œstrum occurred after crushing the cysts in seven animals, conception after one treatment in one animal, after two to four treatments in three animals. Six animals did not conceive after several treatments (endometritis ? salpingitis ? and, we think, probably also blocked Fallopian tubes—G.M.).

(3) COWS WITH INACTIVE AND ATROPHIC OVARIES (36).—Ovarian massage in nine animals caused six of them to come on heat and five conceived. After use of vethormone on nine animals œstrum appeared in six after four to seven days and in five cows conception resulted.

Fourteen cows had normal ovaries implanted subcutaneously and intramuscularly. Of these 13 were in œstrum within five to 57 days and seven within five to 10 days after the operation. Of the implantation cows 11 conceived. The success of this operation, in the absence of cysts, and yellow bodies, and lack of clinically proveable endometritis, is very good.

Moussu, G.—Aphthous Stomatitis and Pseudo-aphthous Stomatitis, importance of their Differential Diagnosis—*Revue Vétérinaire*, June, 1927.

WHEN foot and mouth disease develops with its usual train of symptoms it occasions no difficulty in diagnosis or appropriate sanitary measures. On the contrary the disguised, defaced and aborted forms lend themselves to confusion, and the consequences of error are important, for they upset the putting into play of a severe sanitary regulation, very burdensome to those who have to submit to it. In cases of doubtful diagnosis of foot and mouth one must order isolation, sequestration of the sick and suspected animals, but the order of declaration of infection cannot and ought not to be put in force until diagnosis is confirmed.

It is, therefore, very important to know how to distinguish true foot and mouth from the numerous pseudo-aphthous stomatites described by different authors under the name of *ulcerous stomatis of toxic origin, papulous or papillary stomatitis, aphthicelle, vesiculous stomatitis*.

The author has observed an important pseudo-aphthous enzootic involving a lot of thirty young breeding animals. These ailing subjects had a healthy apprearance, were lively and brisk, none of them showed abnormal salivation or suction noise ; there were no painful movements of the feet and the animals change places without hesitation ; no visible lesion at the side of the claws is observed. On buccal examination one discerned in a bull a scratch on the pad and a circular ulcerous lesion with indurated edges on the middle of the frenum

and lower lip. A heifer showed seven little exulcerations under the upper lip, circular or oval at the periphery, of a prominent dark colour on the rose tint of the mucosa. None of these lesions showed in their depths, a bright rose red, the budding of an aphthous lesion in process of cicatrisation. On a second visit, 24 hours later, the general state of the animals appeared quite good and nothing justified one in suspecting any illness. The bull was still the carrier of the ulcerous lesion and the heifer only presented three small exulcerations. Later other heifers showed little ulcerations in the mouth, but without the health being impaired. This pseudo-aphthous stomatitis which Moussu designates *herpetic stomatitis* and which develops without any alterations in the general health cannot be confounded with true aphthous stomatitis of which the contagious character is very marked ; moreover, when even benign aphthous fever occurs as a rule one finds animals in the herd showing foot lesions.

It ought not to be forgotten that there are banal and pseudo-aphthous stomatites, contagious or not, whose differential diagnosis may be a delicate matter, above all during an epizootic, but nevertheless possible according to the individual characters of evolution. Only foot and mouth disease confirmed justifies declaration of infection and application of measures as a result.

Barat, M.—Oil of Chaulmoogra in the Treatment of Demodectic Mange.—*Recueil de Méd. Vét.*, Nov. 15th, 1926.

To the already long list of all the antidemodectic panaceas the author adds a new remedy, used for two years, which has given him rapid cures without relapses : oil of chaulmoogra.

The formula used is that which Dr. Noc employs against leprosy in man.

Acid phenic	10 grammes.
Ether	250 ,,
Oil of Chaulmoogra	750 ,,

This mixture has been applied to some 50 dogs presenting all the lesions localised or generalised of the squamous form ; the diagnosis of demodectic mange was controlled by microscopic examination. During five to six days one made a daily application of the solution by means of a wad of cotton wool without rubbing in ; afterwards one repeats it every two or three days until the hair shoots up and the skin regains its normal state. Once a week the treated regions are cleaned with camphorated alcohol. Cure takes place at the end of three to six weeks, according to the extent of the lesions ; no relapse has been observed.

This remedy has some inconveniences : (1) The disagreeable odour

and high price; (2) Its irritant action on the sensitive skin when dabbing is replaced by friction; (3) Its ingestion causing vomiting when repeatedly licked.

On the contrary, oil of chaulmoogra has real therapeutic qualities: (1) It is endowed with great penetrative power, due to the presence of ether; (2) The use of the oil avoids clipping the animal and assures a perfect contact of the remedy with the skin.

International Office for Epizootiology*.

In 1920, after the appearance of cattle plague in Belgium, the French Government took the initiative of organising an International Conference for the study of epizootic diseases and their prevention.

The Conference, which took place in Paris from the 25th to 28th May, 1921, was composed of the representatives of 43 nations, states or dominions. The opinion was expressed that a permanent International Office ought to be set up in Paris and placed under the authority of a committee composed of technical delegates from the different states who would meet at least once a year.

There was much delay, however, and the first meeting of the Committee was not held until March 8th last, when the opening ceremony was performed by M. Queuille, the French Minister of Agriculture, in the presence of delegates from 24 countries.

Mr. Cabot, Superintending Inspector, Veterinary Department, Ministry of Agriculture, represented Great Britain and Australia was represented by Capt. Ross Grant.

M. de Roo, of Belgium, was elected President, and M. Leclainche, Director of the International Office.

The next meeting of the Committee will take place in May next, when prophylactic measures in connection with rabies, and certain questions relating to foot and mouth disease will form part of the agenda.

Heymans and Bouckarts.—Acetylene as a General Anæsthetic.—*Revue Vétérinaire*, Vol. 78, p. 496. Ex *Schweizer Archiv. f. Tierheilkunde*, p. 222, April, 1927.

By means of Drägers apparatus an acceptable narcosis may be obtained with a mixture of 85 parts of acetylene and 15 parts of oxygen. In dogs there is a few minutes' preliminary exciting stage followed immediately by drowsiness and narcosis. Deep narcosis can be kept up with very small quantities of acetylene. The advantage of this narcosis lies in the quick occurrence of the necessary insensibility to pain and in the marked muscular relaxation, the quiet breathing

* Abstracted from the Revue Générale de Médecine Vétérinaire, April, 1927.

and an apparently very small disturbance of circulation. Danger of firing of the mixture is against it and the technique of the apparatus is troublesome to the anæsthetist, but the after effects of the anæsthetic are less disagreeable than those of ether and chloroform narcosis.

Lührs, Professor.—Distemper.—*Zeitschrift für Veterinärkunde*, May, 1926, p. 129, ex *Rev. Gén. de Méd. Vét.*, February 15th, 1927.

THE author carried out in 1920 and 1921, with Drs. Klempin and Richters and Madame Herrfurth, numerous experiments in inoculation of the rabbit with various tissues of dogs affected with distemper in its various stages. Rabbits were inoculated with secretions, filtered or non-filtered, from the nose, conjunctiva, bronchi and also the contents of pustules subcutaneously intravenously, into the cornea, and into the frontal sinuses ; the blood filtered and not filtered, the filtrate of the discharges, the brain, under the dura mater, into the anterior chamber of the eye. These experiments carried out on over 200 rabbits have convinced us that the transmission of this disease of the dog to the rabbit is not realisable. Similar tests on the guinea-pig with filtrates after Waldmann's method have given the same negative results.

Sowings on different media, ærobic and anærobic, have given no culture. The experiences of infection by cohabitation realised in the lazaret of the Berlin School, do not furnish anything fresh. The first symptoms appear from 4 to 23 days after contagion.

Another series of researches confirms the assertion of Carré that the blood is only virulent in the initial period of the malady. The blood of dogs recently affected transmits to dogs in a state of receptivity an almost always fatal infection.

What is the significance of pustules ? Livesey considers them as characteristic of the malady and the best diagnostic sign. Dunkin asserts that he has never observed them in the experimental malady and does not believe in their specificity. Before him Carré had already come to this conclusion. The trials showed that pustules can develop in the skin of the dog after inoculation of the contents of the pustules. These are less developed (in weaker form) than in the natural disease ; they cannot be obtained in the horse, the pig, the rabbit, the guinea pig nor in man.

One finds in all quite recent cases of the malady without lesions of the skin and mucosæ, lesions of the liver and kidneys visible to the naked eye and brought out by histological study. Cerletti had shown that there exists at the commencement of the evolution of catarrh without complications, without an acute affection, disseminated lesions

of the brain and marrow exhibiting anatomically a nervous form of the ailment.

Visceral alterations have the same histological evolution as pustules of the skin and mucosæ ; they may disappear very quickly without leaving any trace like cutaneous pustules. It may be admitted besides that cutaneous pustules are due more or less to a ubiquitous virus which becomes active during the evolution of the malady.

From this point of view the communication of Orel and Silberstein on the presence in the saliva of dogs of a filterable virus is most interesting.

REFERENCES.

Dunkin.—Vesico-pustules and Distemper.—*Veterinary Record*, February 27th, 1926.

Cerletti.—On the Different Encephalitis-Myelitis Forms in Distemper-sick Dogs.—*Zeitschrift für d. ges. Neurologie und Psychiatrie*, 1912, p. 520.

Orel and Silberstein.—On the Occurrence of Encephalitis Virus in the Naso-pharyngeal Cavity of Healthy Dogs.—*Zeitschrift d. ges. Experiment Med.*, 1925, p. 280.

Gentet, M.—Treatment of Anasarca by Uroformin.—*Recueil de Méd. Vét.*, February 15th, 1927, p. 85.

A HORSE affected with serious anasarca, treated unsuccessfully for five days by a quack, was put in our charge. In spite of usual success of treatment by antistreptococcic serum, we had recourse to subcutaneous injections of uroformin (10 grammes in 20 grammes of distilled water). The injections were made morning and evening for four days : the oedema began to be absorbed on the second day and disappeared on the fifth day.

The happy results obtained in 1923 by James, who used intravenous injections of formic aldehyde (three to four grammes in 30 grammes of water), those which have been reported by Nicholas, Eloire, on the beneficial effects of formol and urometin show the great therapeutic value of formic aldehyde and its derivatives in anasarca of the horse.

Review

Handbook for Veterinary Surgeons. By FRED BULLOCK, LL.B. (Lond.), of Gray's Inn, Barrister-at-Law ; Fellow of the Chartered Institute of Secretaries ; with a Preface by Sir John M'Fadyean, LL.D., B.Sc., M.B., C.M., M.R.C.V.S., Principal and Dean of the Royal Veterinary College, London ; Past President of the Royal College of Veterinary Surgeons. Taylor and Francis, Red Lion Court, Fleet Street, E.C.4. Price 2s. 6d. net.

AT the last annual meeting of the Royal College of Veterinary Surgeons, Mr. Fred Bullock was re-elected, for the twenty-first time Registrar and

Secretary, and it is a happy coincidence that now, two months later, we should have placed before us his excellent handbook.

For twenty years Mr. Bullock has unassumingly devoted his brilliant talents and unfailing energy to the well-being of the veterinary profession, and his book forms a fitting mark of the close of this unswerving loyalty.

His recent work is our signpost, pointing the way to the centre of the maze of professional ethics.

In very small compass has been included information on all points of professional conduct, and matters that have been obscure to most of us are set forth with a lucidity which is attained by the author's complete mastery of his language.

At the outset of his professional career, the fresh diplomé finds himself faced with innumerable problems in regard to his relationships with his clients and with his fellow practitioners, and although it has been truly stated that perfect professional conduct only means "gentlemanly" conduct—in the best sense of the word—professional ethics has become a complicated subject, and it is essential that the young graduate should have some guidance in a matter upon which the success of his career depends, just as much as it does on professional skill. We welcome Mr. Bullock's Handbook particularly for this purpose.

Every student should lay the foundation of his professional career by purchasing a copy on the very day he graduates, and, indeed, no member of the profession can afford to be without it. This is clearly shown by a recitation of the chapter headings: Administration of the Profession; Rights and Duties; General Practice; Legal Responsibilities; Post-Graduate Training; Taxes, etc.; Government Services. There is also an appendix giving a list of Acts and Orders with which the profession is concerned, and a list of useful addresses.

This little book will become the *vade-mecum* of the veterinary profession; an unfailing mentor. Its precepts are high ones founded on worthy traditions.

Correspondence

FREE VETERINARY AID.

To the Editor of THE VETERINARY JOURNAL.

DEAR SIR,—

WITH the active co-operation of local veterinary surgeons, many of this Society's branches are arranging that free veterinary advice shall be given to animal owners who are unable to pay the usual fees—in some cases this is generously extended to free veterinary treatment. It is the earnest desire of this Society to enlist still further the co-operation of the veterinary profession in this matter, because we realise that by this method a great amount of animal suffering can be prevented, and because we are strongly of the opinion that all advice of this kind can best be given only by qualified practitioners. It is well known that the medical profession charge very low fees and, through the hospitals, no fees whatever for medical attention in the case of a patient who cannot afford to pay, and it is hoped that a similar system can be formulated throughout the country in regard to animal treatment.

In the majority of instances, free veterinary advice only is given on the recommendation of our local branch officials and every precaution is taken to see that people, who can really afford to pay, do not get this gratis assistance.

It has been suggested to me that if it were announced through your paper that such a scheme has actually started, many veterinary surgeons would kindly offer their services for local work in this connection. I need hardly say I should be only be too glad to hear from any members of the profession who are willing to co-operate in this way, so that I might be able to put them into touch with the officials of the nearest R.S.P.C.A. Branch, in order that a practical first-aid scheme might be inaugurated.

Yours faithfully,

E. G. Fairholme, Captain.
Chief Secretary,
Royal Society for the Prevention of Cruelty to Animals.
105, Jermyn Street, London, S.W.1.
August 18th, 1927.

THE OPENING CEREMONY OF THE ROYAL VETERINARY COLLEGE.

At the Opening Ceremony of the Royal Veterinary College on Tuesday, October 4th, we noticed two dogs, with collecting boxes, moving about in the crowd.

They had come there accompanied by their respective owners, Miss Bertram and Miss L. Drake, two ladies who have already proved their interest in our cause in a very practical manner. Miss Bertram's Alsatian bitch's mute appeal was irresistible and she voluntarily offered to shake hands with whoever donated something to the box, whilst Miss Drake's dog —"Cracker Boy"—a cocker spaniel—carried round two collecting boxes, one at each end of a piece of thick stick, each with the money entrance visibly depicted. This latter little animal collected £1 19s. 6½d. during the afternoon and the Alsatian has already been instrumental in extracting over £21 out of the pockets of his friends and neighbours.

The idea is one which we recommend to the notice of the well wishers of the old College as being worthy of imitation; not forgetting that every pound collected means two, owing to the Government generosity in promising pound for pound up to the sum of £35,000.

Errata

"Veterinary Journal," September, 1927. General Article.

THE ROYAL COMMISSION ON AGRICULTURE IN INDIA AND THE INDIAN VETERINARY SERVICE.

(1) Page 436, line 19.—Sentence should read "Under the existing organisation the Director is under the control of the Agricultural Adviser, and he is the latter's sole source of information on veterinary affairs."
(2) Page 437, line 5.—For "10 years" read "18 years."
(3) Page 437, line 34.—For "1922" read "1923."
(4) Page 438, line 9.—For "five" read "four."